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F24C 3/04

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GB A 2068106
GB 1504138

(58) Field of search
F4W
Selected US specifications from IPC sub-class F24C

(54) Simulated solid fuel gas fire

(57) A solid fuel effect gas fire (10) comprises a chamber (13) into which a gas injector (14) entrains air to form a mixture which can permeate through a perforated ceramic radiant plaque (20) which is disposed above the chamber (13). A ceramic fibre spacing blanket (23) and blocks (24,25) space imitation coal or other solid fuel pieces (26) from the plaque (20) so that combustion of the mixture can take place in the spaces between the pieces (26) and between the pieces (26) and the plaque (20). The plaque (20) glows and serves to radiate heat to supplement the heat of the burning gas/air mixture.

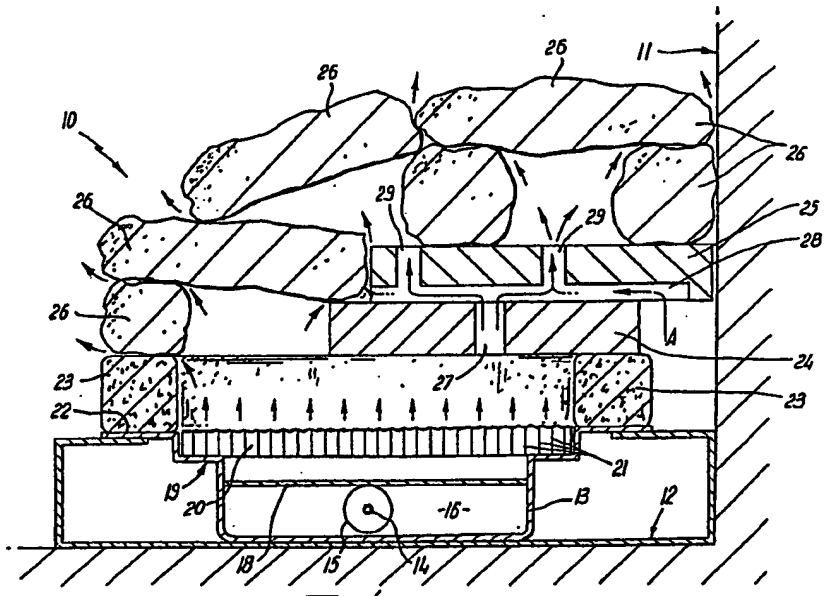

FIG.1

GB 2 185 100 A

The drawings originaly filed were informal and the print here reproduced is taken from a later filed formal copy.

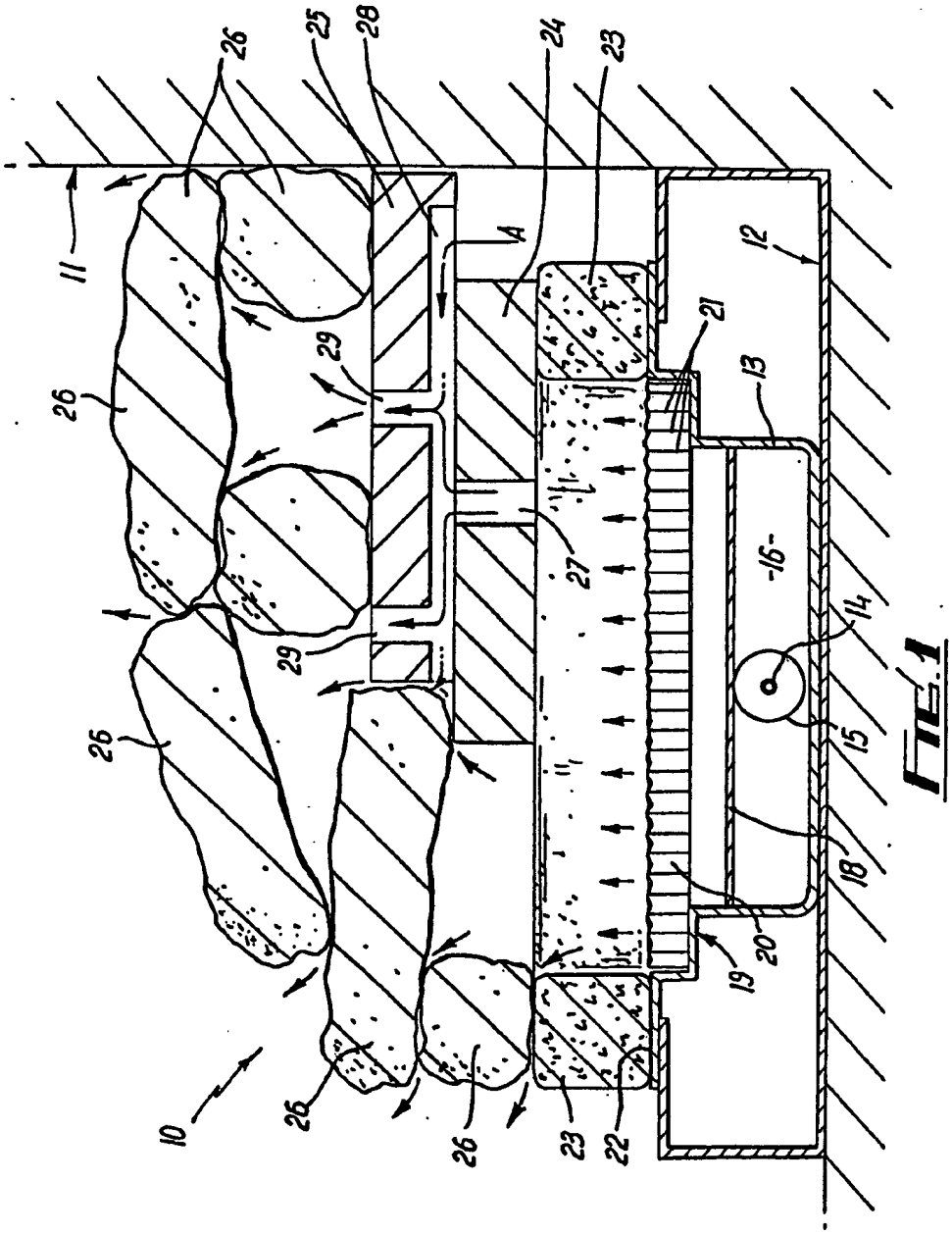
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FIG. 1

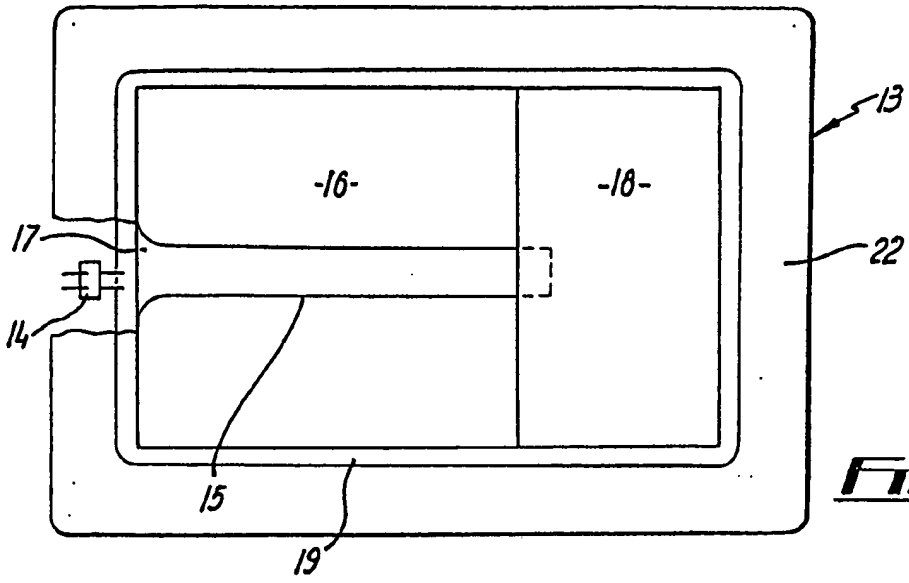

FIG.2

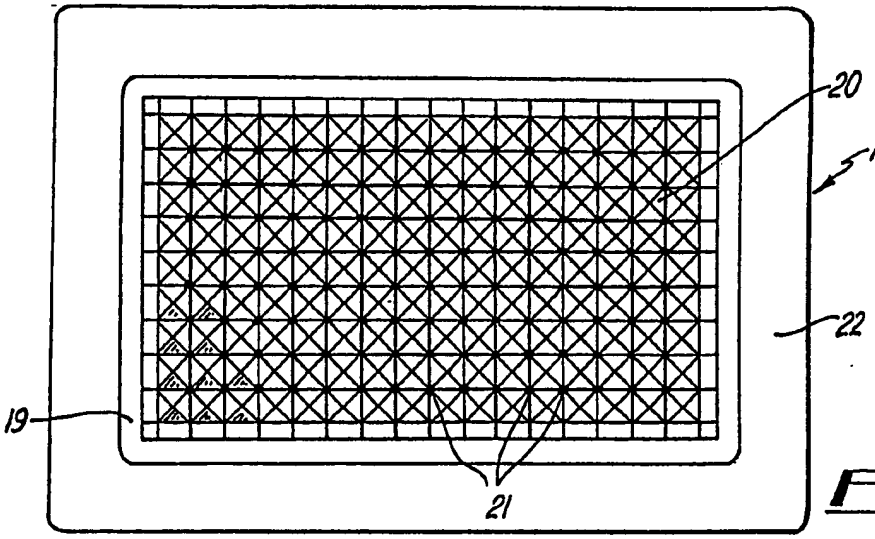

FIG.3

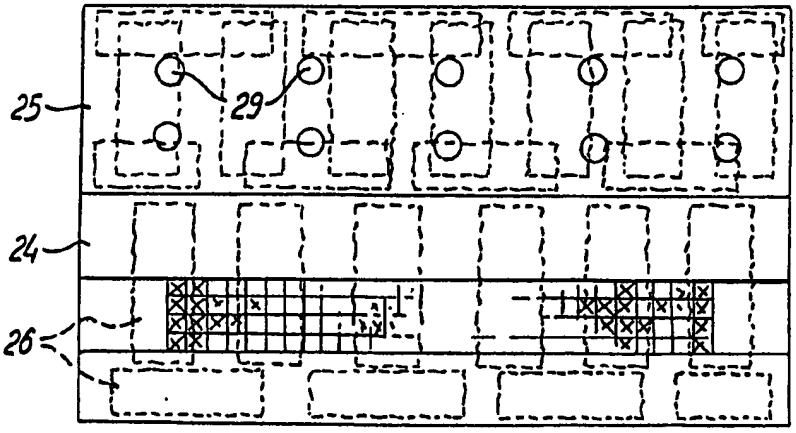

FIG.4

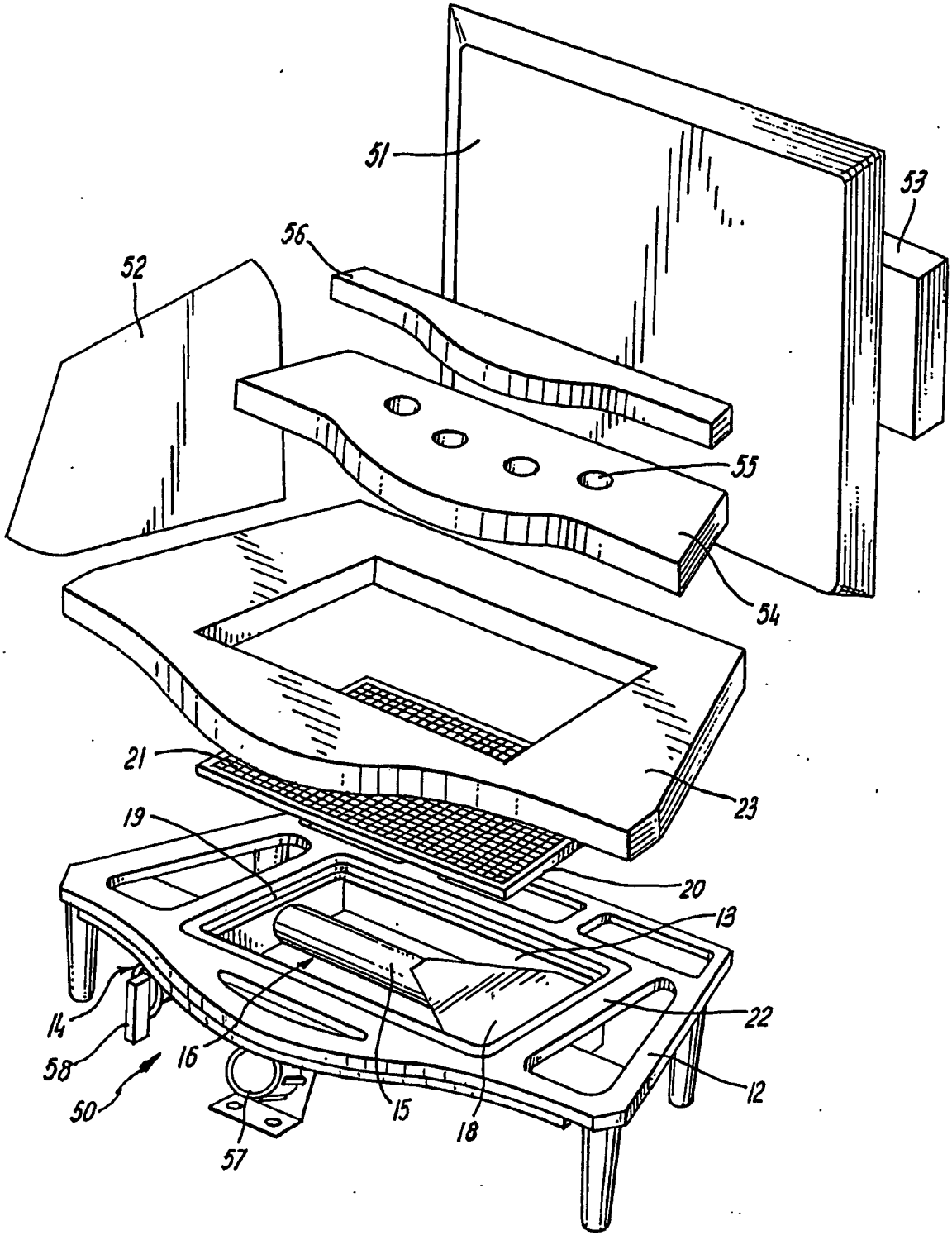

FIG. 5

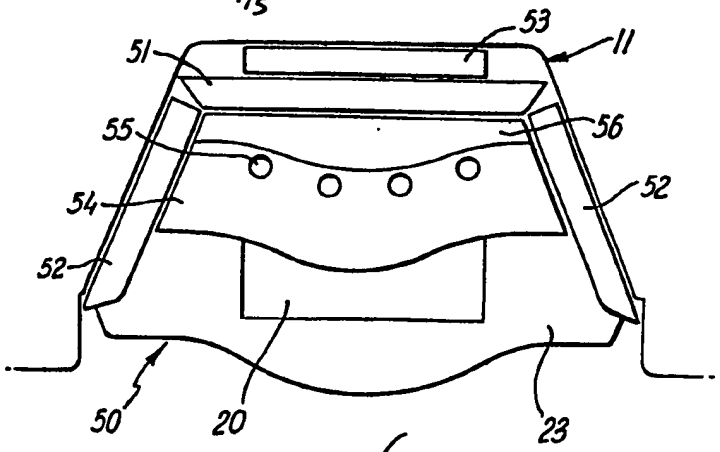
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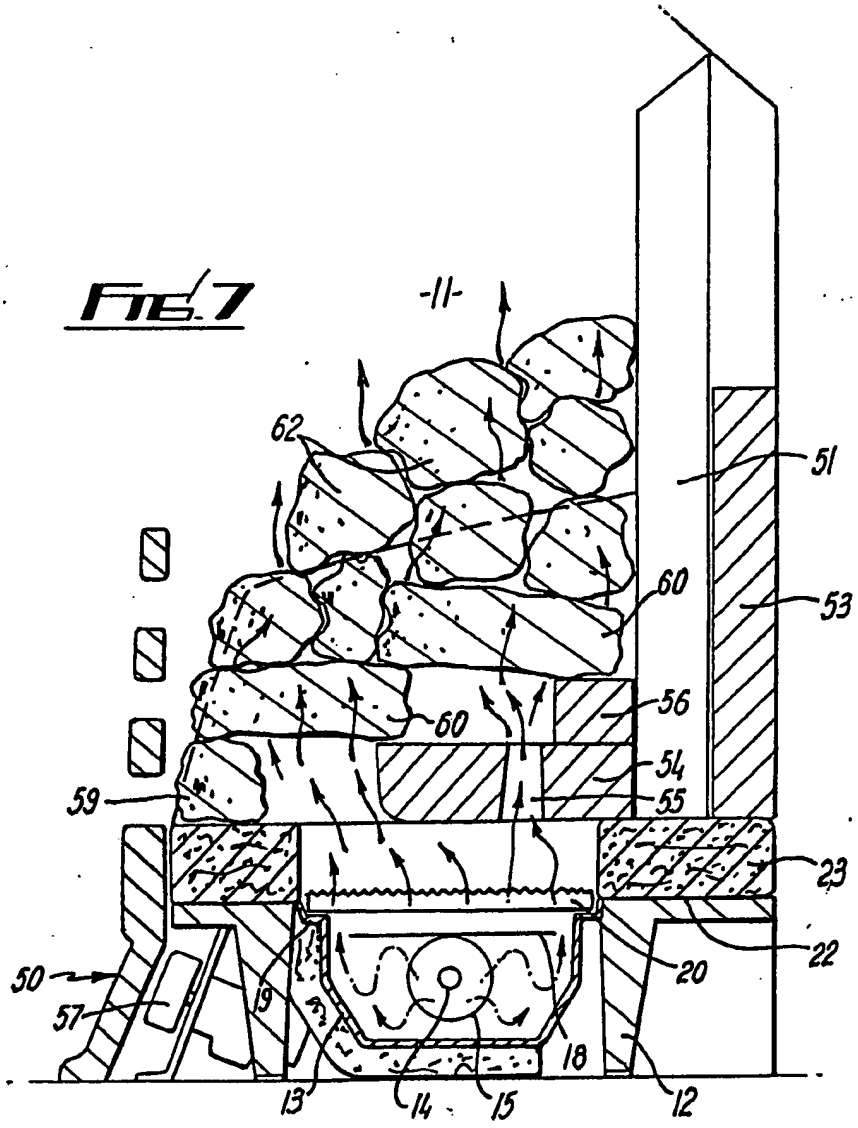
FIG. 6

FIG. 7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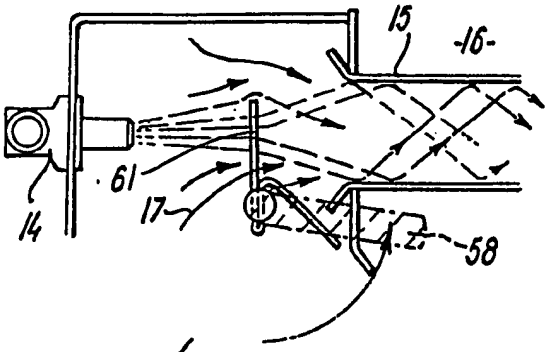

FIG.9

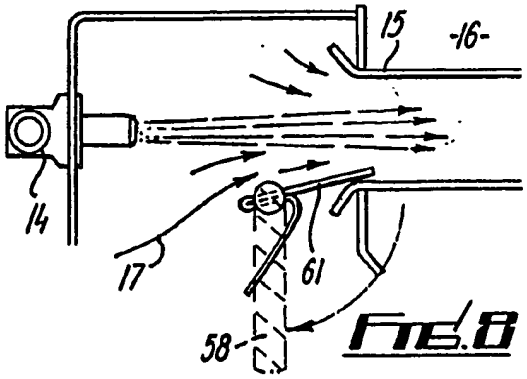

FIG.8

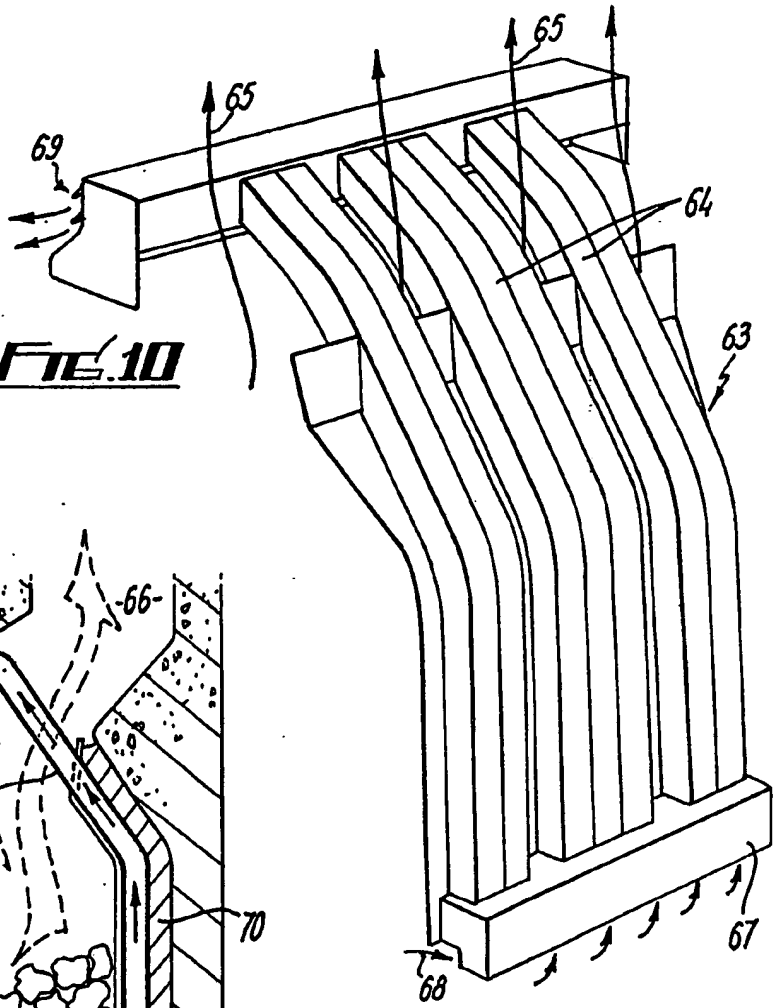

FIG.10

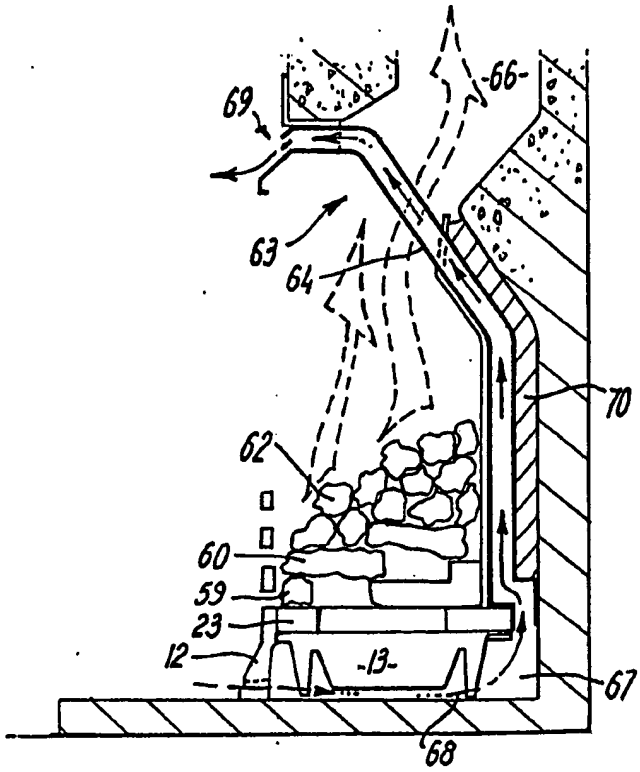

FIG.11

SPECIFICATION

Fire

This invention relates to fires and in particular to fires using gas fuel but having the appearance of a coal or other solid fuel fire.

Coal-effect gas fires are already known. One type of such fire comprises a steel tray on which a ring burner is disposed. The burner and tray are covered in sand and imitation coal is placed on top of the sand. The neat gas passes through the sand and is ignited in the air spaces between the imitation coal pieces. To improve the efficiency of such a fire an aperture has been provided in the tray centrally of the burner so that air may be drawn upwardly therethrough to mix with the gas passing through the sand, thereby aiding combustion. Such an arrangement provides a burning gemperature in the region of 800°C. A second type of coal-effect gas fire has a vertical gas injector beneath a vertical tube, the gas entraining air from around the injector into the tube. A cover above the open top of the tube deflects the air gas mixture laterally into an annular space which is filled with mica. The mica also extends above the cover, and allows the air-gas mixture to permeate therethrough to imitation coal disposed above it. Again the air-gas mixture is burned in the spaces between the pieces of imitation coal. Such an arrangement can give a burning temperature in the region of 1000°C.

A third type of such a fire has gas and entrained air injected into an improved gas/air mixing chamber, the chamber having apertures in the top and front thereof through which the mixture passes to be ignited in spaces between pieces of imitation coal disposed above and in front of the mixing chamber. Such an arrangement can produce a burning temperature of about 1080°C. For similar gas inputs the abovementioned fires produce approximately 1 kw, 1½ to 2 kw and 2½ kw heat output respectively.

It is an object of the present invention to provide a fire of the fuel-effect, gas-burning type in which the combustion process is more efficient than with the known fire arrangements.

The invention provides a solid fuel-effect gas fire comprising a chamber, a gas injector operable to inject gas into said chamber and to entrain air from adjacent said injector to pass into said chamber with said injected gas to be mixed therewith in said chamber, the upper surface of said chamber comprising a perforated radiant plaque through which said mixture may pass, and a plurality of pieces of non-combustible imitation fuel disposed above said chamber providing spaces therebetween in which combustion of said mixture may be effected.

Preferably said plaque is a ceramic radiant plaque having a plurality of apertures therein disposed substantially uniformly spaced over the surface thereof.

Preferably spacing means of a non-combustible material is located adjacent said plaque, thereby providing that said imitation fuel pieces are spaced from said plaque to form a combustion space therebetween. Said spacing means may have apertures therethrough through which said mixture and/or air may pass. The fire may also comprise heat exchanger means comprising at least one tube around which combustion gases may flow and through which air may pass to be heated by said combustion gases.

Embodiments of fuel-effect gas fire in accordance with the invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is a cross-sectional side elevation of one embodiment of assembled fire,

Figures 2 and *3* are plan views of the chamber of Figure 1 with the plaque removed, and in situ respectively,

Figure 4 is a plan view of the assembled fire of Figure 1,

Figure 5 is an exploded view of a second embodiment,

Figures 6 and *7* are plan and side views of the embodiment of Figure 5 without coals, and with coals respectively,

Figures 8 and *9* are side views of the flame control mechanism of Figure 5 in the off and on positions respectively, and

Figures 10 and *11* are rear and side views respectively of a heat exchanger.

Referring now to Figures 1 to 4 there is shown a fire 10 which is shown as being rectangular in plan view for convenience but in practice would be of planform to suit the shape of the fire recess 11 in a building. The fire 10 comprises a cast iron grate 12 in which a cast iron chamber or burner box 13 is disposed. A gas injector 14 is mounted on the side of the burner box 13 to inject gas from a supply (not shown) into a venturi tube 15 extending centrally across the interior 16 of the burner box 13. The entrance 17 of the tube 15 is spaced from the gas injector 14 so that the gas injected into the tube 15 entrains air from adjacent the injector 14. The other end of the tube 15 is open and above it is a deflector plate 18. By this means the air and gas are mixed in the tube 15 and in the interior 16 of the burner box 13 to form a readily combustible mixture. Resting on a peripheral lip 19 provided around the burner box 13 is a perforated ceramic radiant plaque 20.

The plaque 20 rests in a substantially horizontal position and the air/gas mixture can pass upwardly through the apertures 21 provided therein. The apertures 21 are disposed substantially uniformly spaced over the surface of the plaque 20 and the upper surface of the plaque 20 is of multi-pyramidal shape to increase its surface area and hence its heat radiating abilities. A suitable radiant plaque for this purpose is a Tennaglo (Registered Trade Mark) ceramic radiant such as is described in U.K. Patent 1,436,842.

Around the rim 22 of the burner box 13 is placed a ceramic fibre blanket 23 which supports at the rear of the fire 10 two ceramic fibre board pieces or blocks 24, 25. Pieces 26 of imitation coal are then placed in a rectangular disposition so as to rest on or bridge the gap between the blanket 23 and the blocks 24, 25, as shown in Figure 1 and in dashed lines in Figure 4. There are apertures 27 in the lower block 24 and an underside cavity 28 communicating with apertures 29 in the upper block 25. By this means the air/gas mixture can distribute itself throughout the full ex-

tent of the fire as shown by the arrows in Figure 1. In addition further air is drawn into the underside cavity 28 from the rear of block 24 as shown by the arrow A in Figure 1. This enables primary combustion of the air/gas mixture to occur as it is emitted from the plaque 20, thereby causing the plaque surface to glow and radiate heat therefrom, and secondary combustion to occur in the spaces between the pieces of imitation coal 26 as more air is drawn in through the underside recess 28. In this way burning temperatures of approximately 1250° can be obtained. However due to the plaque 20 being beneath the combustion area, and not above it as is generally the case with radiant plaques which are mounted in a vertical or near vertical position, and due to the cooling effect of the large quantities of air being drawn into the fire, the plaque 20 can be maintained at its design temperature of approximately 1000°C.

It is to be noted that the plaque 20 is not secured in place on the lip 19 of the burner box 13, thereby allowing it to expand and contract freely and reducing the risk of fracture.

Referring now to Figures 5 to 7 there is shown a fire 50 which is similar in many respects to the fire 10 previously described, and corresponding parts in the two embodiments are identified by the same reference numerals. In the case of fire 50 it is shaped in plan view to suit the shape of a fire recess 11 in a building. The fire 50 comprises a cast-iron grate 12 and burner box 13, a gas injector 14, venturi tube 15, deflector plate 18 and perforated ceramic radiant plaque 20 resting on a lip 19 of the burner box 13, as with the previous embodiment. Also as with the previous embodiment a ceramic fibre blanket 23 is located around the rim 22 of the burner box 13. At the rear and sides of the fire 50 and supported on the blanket 23 are a ceramic insulating back brick 51 and sidecheeks 52, the back brick 51 being spaced from the rear of the fire recess 11 by a blanket spacer 53. Also located at the rear of the fire 50 and supported by the blanket 23 is a matrix 54 of ceramic fibre board having apertures 55 extending therethrough. A support bar 56 rests upon the matrix 54 at the rear thereof. Beneath the grate 12 at the front of the fire 50 is a gas control 57 which comprises a rotary knob controlling a valve (not shown) which is movable in the gas supply pipe (not shown) between gas cut-off and gas fully on positions. A flame control lever 58 is also provided beneath the grate 12 and is operable in the off position as shown in Figure 8 to allow full, smooth flow of gas from the injector 14 and air from its surroundings into the venturi tube 15 and interior 16 of the burner box 13. A high efficiency flame is thereby obtained. By turning the flame control lever 58 to the on position as shown in Figure 9, the flow of gas from the injector 14 is interrupted by the deflector 61 so that a turbulent flow of air/gas mixture occurs in the venturi tube 15. Although the air supply is not restricted by this means, a luminous flame is obtained.

To complete the fire a plurality of small finger imitation coals or other solid fuel pieces. e.g. logs 59 are placed on the front of the blanket 23 and longer finger imitation coals, logs or the like 60 are placed to bridge the matrix 54 and the small fuel pieces 59. A second set of larger finger imitation fuel pieces 60 are then placed to bridge the support bar 56 and the previously laid fuel pieces 60. Randomly sized imitation coals, logs or the like 62 may then be placed randomly over the finger fuel pieces 60 to produce a natural solid fuel fire appearance. The gas/air mixture emanating from the tube 15 can permeate through the apertures 55 in the matrix 54 and through the spaces between the fuel pieces 59, 60, 62 where they are ignited to produce a realistic solid fuel fire effect. The surface of the plaque 20 will glow and radiate heat therefrom and the ceramic back brick 51 and side cheeks 52 also radiate heat into the room so that the fire is as efficient as possible.

Referring now to Figures 10 and 11 there is shown a heat exchanger 63 which may be incorporated in either of the previously described embodiments of gas fire. The heat exchanger 63 comprises a plurality of tubes 64 which are disposed in spaced array behind and above the fire so that the combustion gases 65 passing to the chimney or flue 66 can pass around the tubes 64. The lower ends of the tubes 64 which have insulation 70 disposed at the rear thereof are connected to a collector box 67 having an air inlet 68 adjacent its base so that cold air can be drawn therein from the room as shown in Figure 11. The cold air passes up the tubes 64, where it receives heat from the combustion gases 65 and hot air passes out of the outlet 69 above and in front of the fire. By this means, some of the heat is removed from the combustion gases and passes into the room due to the convection of the air through the tubes 64. The heat exchanger 63 replaces the back brick 51 and blanket spacer 53 as shown in Figures 5 to 7.

CLAIMS

1. A solid fuel effect gas fire comprising a chamber, a gas injector operable to inject gas into said chamber and to entrain air from adjacent said injector to pass into said chamber with said injected gas to be mixed therewith in said chamber, the upper surface of said chamber comprising a perforated radiant plaque through which said mixture may pass, and a plurality of pieces of non-combustible imitation fuel disposed above said chamber providing spaces therebetween in which combustion of said mixture may be effected.

2. A gas fire according to claim 1 wherein said plaque is a ceramic radiant plaque.

3. A gas fire according to claim 2 wherein said plaque has a plurality of apertures therein disposed substantially uniformly spaced over the surface thereof.

4. A gas fire according to claim 3 wherein the plaque has an upper surface of multi-pyramidal shape.

5. A gas fire according to any one of claims 1 to 4 wherein said plaque is disposed substantially horizontally.

6. A gas fire according to any one of claims 1 to 5 wherein said chamber has a peripheral lip on which said plaque is non-securedly supported.

7. A gas fire according to any one of claims 1 to 6 comprising spacing means of a non-combustible

material located adjacent said plaque, whereby said imitation solid fuel pieces are spaced from said plaque to form a combustion space therebetween.

8. A gas fire according to claim 7 wherein said spacing means has at least one aperture extending therethrough through which said mixture may pass.

9. A gas fire according to claim 7 or claim 8 wherein said spacing means comprises a ceramic fibre blanket.

10. A gas fire according to claim 9 comprising a ceramic back brick disposed to be upstanding at the rear of and supported by said blanket.

11. A gas fire according to claim 9 or claim 10 comprising a ceramic side cheek disposed to be upstanding at each side of and supported by said blanket.

12. A gas fire according to any one of claims 1 to 11 comprising a venturi tube extending across said chamber, said venturi tube having an opening at one end thereof adjacent one side of said chamber and adjacent which opening said gas injector is located.

13. A gas fire according to any one of claims 1 to 12 comprising a gas control operable to control the quantity of gas supplied to said gas injector.

14. A gas fire according to any one of claims 1 to 13 comprising a flame control operable to deflect the flow of gas issuing from said injector and cause the flow of air/gas mixture passing into said chamber to be turbulent.

15. A gas fire according to any one of claims 1 to 14 wherein said chamber is formed in a grate.

16. A gas fire according to claim 15 wherein said grate is of cast iron.

17. A gas fire according to claim 12 or any claim dependent thereon comprising a deflector plate disposed above said venturi tube at the end thereof remote from said injector, said remote end of said tube having a second opening therein.

18. A gas fire according to any one of claims 1 to 17 comprising a heat exchanger.

19. A gas fire according to claim 18 wherein said heat exchanger comprises a plurality of tubes disposed to extend in spaced array behind and above said fire and between which combustion gases from said fire may pass.

20. A gas fire according to claim 19 wherein an inlet end of each tube is located at the rear of and below said chamber.

21. A gas fire according to claim 19 or claim 20 wherein an outlet end of each tube is located above and in front of said fire.

22. A gas fire substantially as hereinbefore described with reference to and as illustrated in Figures 1 to 4 or Figures 5 to 9 of the accompanying drawings.

23. A gas fire according to claim 22 substantially as hereinbefore described with reference to and as illustrated in Figures 10 and 11 of the accompanying drawings.

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